

THE COMMISSIONER OF PATENTS
Washington, D.C. 20231

Case Docket No. 33848/GM/vp

Sir:

Transmitted herewith for filing is the Patent Application of:

Inventor(s): Elio MARIONI

For: "ELECTRONIC POWER SUPPLY FOR A SYNCHRONOUS MOTOR WITH PERMANENT-MAGNET
ROTOR HAVING TWO PAIRS OF POLES"

Enclosed are:

- ☒ Small Entity verified Statement.
- ☒ Four sheets of drawing on strong paper (M.P.E.P. 608.02 - rev. 81)
- ☒ An Assignment of the Invention to ASKOLL HOLDING S.r.l.
- ☒ A Certified Copy of an Italian Patent Application
- ☐ Associate Power of Attorney


CLAIMS AS FILED

	(1) for	(2) number filed	(3) number extra	(4) rate	(5) basic fee \$ 345.=
Total claims		14 - 20 =		x \$ 9.=	
Independent claims		3 - 3 =		x \$ 39.=	
				Total filing fee	\$ 345.=

- ☒ Please charge my Deposit Account No. 13-3860 in the amount of \$ 345.=.
A duplicate copy of this sheet is enclosed
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Account No. 13-3860.
A duplicate of this sheet is enclosed.
- ☐ A check in the amount of _____ to cover the filing fee is enclosed.

Milan, Italy

July 31, 2000


Guido MODIANO
(Reg. No. 19,928)

08/02/00

JCS35 U.S. PTO

09/630732

U.S. PTO

08/02/00

09630732-080200

MODIANO, JOSIF, PISANTY & STAUB
EUROPEAN PATENT ATTORNEYS** U.S. PATENT AGENTS*
Via Meravigli, 16 - I-20123 MILANO - ITALY
Phone IT+02+869 2442 Fax IT+02+863860

DR. ING. G. MODIANO* ** (Reg. No. 19,928)
DR. ING. A. JOSIF* ** (Reg. No. 22,917)
DR. ING. M. PISANTY*
DR. ING. G. STAUB*
Daniel J. O'BYRNE** (Reg. No. 36,625)
DR. ING. N. ZANOTTI*
DIPLO. ING. C. S. RENIERO*
S. L. A. MODIANO*

Milano, July 31, 2000

New US Application in the name of
Elio MARIANI

Agent's Docket: 33848/GM/vp

Hon.
COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON D.C. 20231
U. S. A.

Transmitted herewith are the following papers for filing a new Application:

1. Specification and claims; Declaration/Power of Attorney duly signed July 27, 2000 and attached thereto;
2. Four Drawings on strong paper accompanying the specification (M.P.E.P. 608.02-rev. 81);
3. Deposit Account order for Filing Fee : \$ 345 dated July 31, 2000 (duplicate);
4. Deposit Account order for Assignment fee : \$ 40 dated July 31, 2000
5. Assignment of the Invention to: ASKOLL HOLDING S.r.l.
6. Small Entity verified Statement.

The priority of the here-under listed Application(s) is respectfully claimed:

- Italian Application No. PD99A000190 filed August 6, 1999

A Certified Copy of the priority Application(s) ~~will be sent in due course~~ is attached.

Please place of record in the file the enclosed papers and kindly acknowledge receipt thereof; please readily collect the credit specified in the Deposit Account order, so as to allow the Application to receive the earliest possible filing date, within:

AUGUST 6, 2000

Respectfully submitted



Guido MODIANO
(Reg. No. 19,928)

Encls.:

- Spec./claims + Declaration/Power
- Formal drawings
- Filing Fee Dep. Acc. order (duplicate)
- Assignment + Fee dep. Acc. order
- Certified Copy
- Small Entity verified Statement

Docket Number (Optional):
33848/GM/vp

Applicant or Patentee: **Elio MARIONI**

Application or Patent No.:

Filing Date or Issue Date:

Title: "ELECTRONIC POWER SUPPLY FOR A SYNCHRONOUS MOTOR WITH PERMANENT-MAGNET ..."

I hereby declare that I am

- ☐ the owner of the small business concern identified below:
- ☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN	ASKOLL HOLDING S.r.l.
--------------------------------	-----------------------

ADDRESS OF SMALL BUSINESS CONCERN Via Industria 30 - 36031 DUEVILLE - ITALY

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith with title as listed above.
☐ the application identified above.
☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

- ☒ No such person, concern, or organization exists.
- ☐ Each such person, concern or organization is listed below:

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Elio MARIONI

TITLE OF PERSON IF OTHER THAN OWNER Managing Director

ADDRESS OF PERSONS SIGNING Via Molino 6 - 36031 DUEVILLE - ITALY

SIGNATURE

DATE July 27, 2000

APPLICATION

FOR

UNITED STATES OF AMERICA

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

Be it known that I,

Elio MARIONI

Italian citizen

of DUEVILLE - ITALY

have invented certain improvements in

"ELECTRONIC POWER SUPPLY FOR A SYNCHRONOUS MOTOR
WITH PERMANENT-MAGNET ROTOR HAVING TWO PAIRS OF
POLES"

of which the following description in connection with the accompanying
drawings is a specification, like reference characters on the drawings
indicating like parts in the several figures.

09530732-000200

BACKGROUND OF THE INVENTION

The present invention relates to an electronic power supply for a synchronous motor with permanent-magnet rotor with two pairs of poles, supplied directly from the mains.

A synchronous motor with permanent-magnet rotor has many applications, especially in the civil sector, where the power levels involved are low or, as an approximate indication, lower than 100 W.

In their most basic structure, these motors have a fixed stator part and a part which rotates about its own axis of symmetry and is termed rotor.

In these motors, the stator is constituted by an iron core which is shaped like a tuning fork and on which spools are fitted which support the windings, powered by the mains with an electronic device interposed.

The rotor is constituted, in its simplest form, by a cylinder of magnetic material which is rigidly coupled to the rotation shaft.

The stator windings, supplied by the mains, produce a magnetic field which interacts with the magnetic poles of the rotor, causing the rotation of the rotor and therefore of the device connected thereto, which can be for example the impeller of a pump.

The advantages of the synchronous motor with permanent-magnet rotor with respect to an induction motor are both technical and economical.

Technically, this type of motor is more compact, for an equal power level, and is always far more efficient than an asynchronous motor.

Another reason for low cost is the simple structure of the rotor and of the stator.

This type of motor is single-phase, since the only winding is supplied with power by the mains voltage.

However, this motor has application limits, particularly when low noise in operation is required.

5

5

5

10

15

15

20

25

SUMMARY OF THE INVENTION

30

30

device which allows complete structural symmetry, which is a further assurance of elimination of vibrations and of noise.

Another object of the present invention is to provide an electronic power supply for a synchronous motor with permanent-magnet rotor which is simple and safe.

Another object of the present invention is to provide an electronic power supply for a synchronous motor with permanent-magnet rotor and a synchronous motor with permanent-magnet rotor and two pairs of stator poles which is very efficient, inexpensive and safe.

These and other objects which will become better apparent hereinafter are achieved by an electronic power supply for a synchronous motor with permanent-magnet rotor with two pairs of poles, according to the present invention, supplied directly by the mains, characterized in that the windings of each pair of poles are supplied by a corresponding electronic circuit, one of said electronic circuits comprising a capacitor which acts as a 90° phase shifter, a static switch being further present on at least one of the two electronic circuits and being controlled by means for detecting the position and polarity of the rotor.

In order to optimize the performance of the motor, particularly during starting, it can be convenient to provide at least one of the electronic circuits with a booster coil which is engaged during starting and disconnected when steady-state operation is achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred embodiment thereof, given by way of non-limitative example and shown in the accompanying drawings, wherein:

Figure 1 is a sectional view of the diagram of a motor according to the present invention;

Figure 2 is a basic diagram of the electronic power supply circuit

09630732.000200

according to the present invention;

Figure 3 is a basic diagram of the power supply circuit with the rotor position sensor;

Figure 4 is a diagram of a phase shifter for the signal that arrives from the rotor position sensor;

Figures 5 and 6 are views of logic devices for driving the static switch;

Figure 7 is a diagram for driving an auxiliary starting coil;

Figure 8 is a diagram of the control of both coils of static switches;

Figures 9 and 10 are views of the control of one of the two coils and of the starting coil by means of static switches.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the above-cited figures, the motor for which the electronic power supply device is designed is a synchronous motor with at least two pairs of poles with a permanent-magnet rotor, designated by the reference numeral 10 in Figure 1.

The motor is composed of a stator 11 which has four pole shoes, designated by the reference numerals 12a and 12b for the first pair and 13a and 13b for the second pair.

Two pairs of windings, respectively designated by the reference numerals 14a and 14b and 15a and 15b, are further present on each one of the two pairs.

In the following pages of the description or in the electrical diagrams, the pair 14a and 14b is illustrated as a single coil 14 and the pair 15a and 15b is illustrated as a single coil 15.

A rotor 16 of the permanent-magnet type is arranged, and can rotate, between the pole shoes 12a, 13a, 12b and 13b.

The motor according to the present invention is supplied with power directly by the mains by means of an electronic circuit.

Such circuit is shown schematically in Figure 2 and substantially comprises the two coils 14 and 15, also shown graphically as being offset by

90 geometric degrees; the coil designated by the reference numeral 14 is supplied by means of a TRIAC 18 which is driven by an electronic device 19, while the coil designated by the reference numeral 15 is supplied with power by means of a capacitor 17 which phase-shifts through 90° the current that circulates in the coil 15 with respect to the current that circulates in the coil 14.

As shown more clearly in Figure 3, the electronic circuit 19 has, as its inputs, a signal which arrives from the mains voltage and a signal which arrives from a position sensor 20 which detects the position and polarity of the rotor.

Driving occurs when the polarity of the mains can produce a torque which is favorable for starting, according to the polarity of the rotor that faces the pole shoe.

This association is achieved by means of the XOR logic function shown in Figures 4 and 5.

The current on the two coils mutually offset by 90° occurs by means of the capacitor 17.

In order to improve the performance of the motor, depending on the position of the rotor position sensor or of the current-voltage phase shift, it can be necessary to apply, by means of the device 21 of Figure 4, a phase shift to the signal that arrives from the position sensor.

In order to further improve the efficiency of the electronic systems, the information related to the current zero-crossing of the motor is acquired so as to drive the TRIAC 18 only when necessary.

The current zero-crossing information can be acquired either by direct measurement of the current or by other methods, such as the voltage across the TRIAC, as shown in Figures 5 and 6.

The current zero-crossing information is passed through an AND logic function together with the output of the XOR function, and the output of the AND function is used to drive the TRIAC 18, as shown in Figure 5 and in

09630732-080200

Figure 6.

In order to further improve the efficiency of the motor, it is possible to use an additional coil, designated by the reference numeral 22 in Figure 7, which constitutes a booster coil which is designed to boost the stator field only during starting.

After starting, operation occurs only by means of the steady-state coil, while transition from the booster coil 22 to the steady-state coil 14 can occur by means of a timer or by means of a block, designated by the reference numeral 23 in Figure 7, which is capable of detecting when the rotor 16 reaches the synchronous speed.

Moreover the device can be implemented with several configurations on the power section, shown by way of example in Figures 8, 9 and 10.

In particular, in Figure 8 both coils 14 and 15 are controlled by means of TRIACs, designated by the reference numerals 24 and 25 respectively.

In Figure 9, control occurs by means of TRIACs 26 and 27 both on the booster coil and on the steady-state coil, as shown in Figure 9, while Figure 10 is a view of a similar embodiment in which the booster coil is a fraction of the steady-state coil and both are TRIAC-controlled.

With a configuration of this type, the resulting field is a rotating field which is equivalent to a pair of poles which also rotate about the same rotation axis as the rotor.

The interaction of the rotating pair of stator poles with the pair of poles of the rotor produces a torque at the axis which is constant in each instant and therefore free from vibrations.

The resulting motor has all the advantages of the high-efficiency synchronous motor with permanent-magnet rotor, while vibration is fully eliminated since the torque is no longer pulsed but is now constant.

Another advantage is that this synchronous motor with permanent-magnet rotor with two pairs of stator poles has a constant torque which tends to make it turn in a single direction.

The control system obtains the intended phase shift between the power
supply currents of the various phases by using an appropriate capacitor, and
also allows direct power supply from the mains without AC/DC conversion.

The system is based on the recognition of the position and polarity of the rotor and of the polarity of the power supply voltage.

15 In this way it is possible to achieve good pick-up and high steady-state efficiency.

20 The dimensions, the materials and the components may of course be any
according to requirements.

The disclosures in Italian Patent Application No. PD99A000190 from which this application claims priority are incorporated herein by reference.

WHAT IS CLAIMED IS:

1. An electronic power supply for a synchronous motor with permanent-magnet rotor with at least two pairs of poles, wherein the windings of each pair of poles are supplied by a corresponding electronic circuit, one of said
5 electronic circuits comprising a capacitor which acts as a 90° phase shifter, a static switch being also present on at least one of the two electronic circuits and being controlled by means for detecting the position of the rotor.

2. An electronic power supply for a synchronous motor with permanent-
10 magnet rotor with at least two pairs of poles, wherein the windings of each pair of poles are supplied by a corresponding electronic circuit, one of said electronic circuits comprising a capacitor which acts as a 90° phase shifter and at least one of said electronic circuits comprising a booster coil, a static switch being also present on at least one of the two electronic circuits and
15 being controlled by means for detecting the position of the rotor.

3. The device according to claim 1, wherein the phase shift capacitor is included in one of the two electronic circuits, while the second electronic circuit has a static switch driven by a circuit which switches on the switch according to the position of the rotor detected by a position sensor and
20 according to instantaneous values of the power supply voltage.

4. The device according to claim 3, further comprising a delay circuit for correcting data acquired by said position sensor.

5. The device according to claim 1, wherein the static switch is driven as a function of the angular position of the rotor, of the values of the power
25 supply voltage and of a value of a current that circulates in said switch.

6. The device according to claim 2, wherein the phase shift capacitor is included in one of the two electronic circuits, while the second electronic circuit has a static switch driven by a circuit which switches on the switch according to the position of the rotor detected by a position sensor and
30 according to instantaneous values of the power supply voltage.

0530732.080200

7. The device according to claim 6, further comprising a delay circuit for correcting data acquired by said position sensor.

8. The device according to claim 2, wherein the static switch is driven as a function of the angular position of the rotor, of the values of the power supply voltage and of a value of a current that circulates in said switch.

9. The device according to claim 2, wherein in a branch that is not affected by the presence of the phase shifting capacitor, an auxiliary booster coil is provided, said coil being engaged in an initial starting step by means of a controlled static switch in order to increase static torque and is disengaged upon synchronization.

10. The device according to claim 9, wherein the booster coil is disengaged by means of a timer.

11. The device according to claim 9, wherein said booster coil is disengaged when a synchronization speed is reached.

12. The device according to claim 1, comprising a structure with a multipole rotor with a stator in which the number of stator pairs is twice the number of rotor pole pairs.

13. The device according to claim 2, comprising a structure with a multipole rotor with a stator in which the number of stator pairs is twice the number of rotor pole pairs.

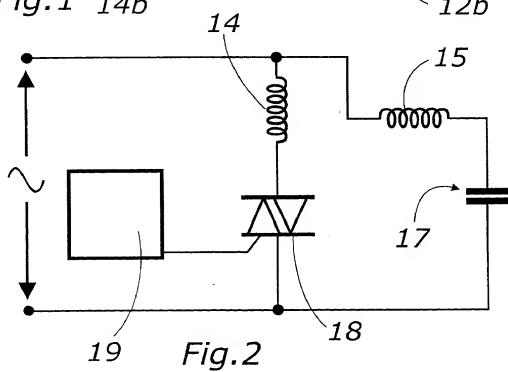
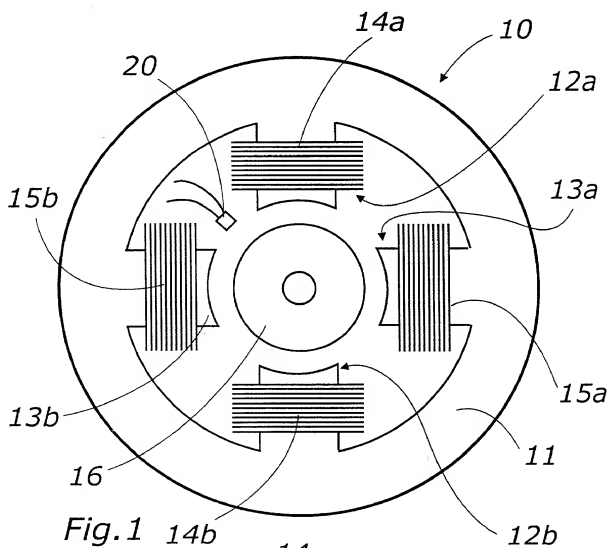
14. A synchronous motor with permanent-magnet rotor having a stator with two pairs of poles, comprising an electronic power supply in which the windings of each pair of poles are supplied by a corresponding electronic circuit, one of said electronic circuits comprising a capacitor which acts as a 90° phase shifter, a static switch controlled by means for detecting the position of the rotor being further provided on at least one of the two electronic circuits.

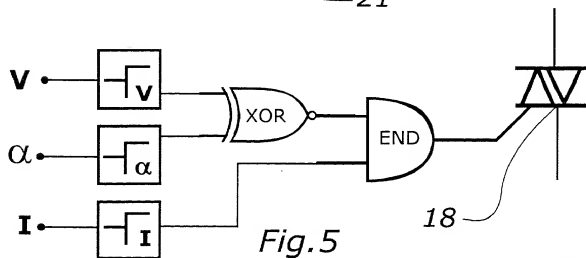
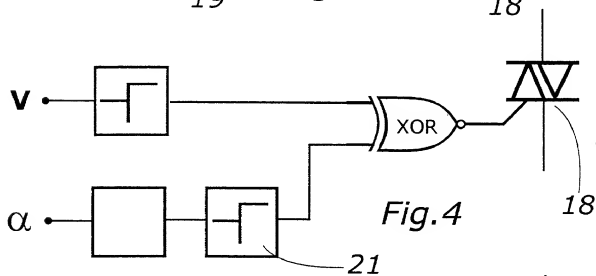
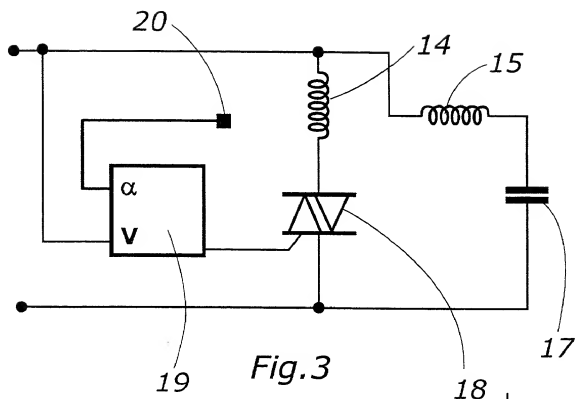
09530732-0000200

ABSTRACT OF THE DISCLOSURE

An electronic power supply for a synchronous motor with permanent-magnet rotor with two pairs of poles, wherein the windings of each pair of poles are supplied by a corresponding electronic circuit; one of the circuits
5 comprises a capacitor which acts as a 90° phase shifter, and a static switch is also present on at least one of the two circuits and is controlled by a sensor for detecting the position of the rotor.

09650732-000200





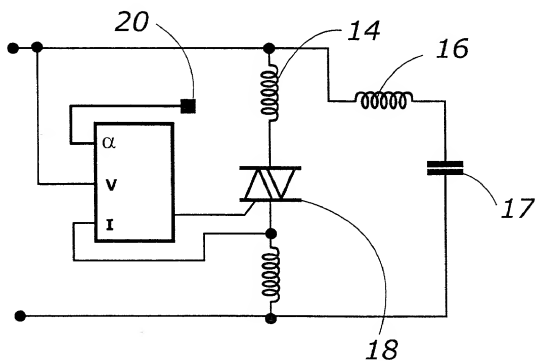


Fig. 6

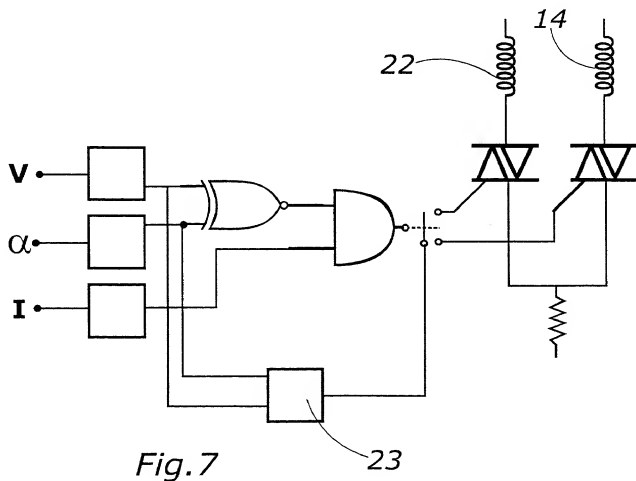


Fig. 7

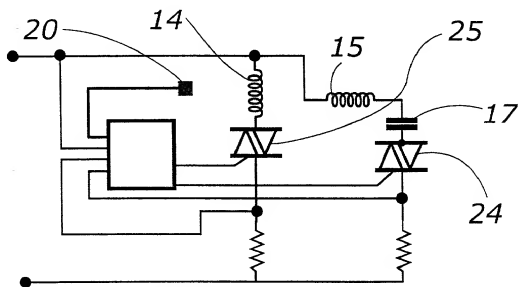


Fig. 8

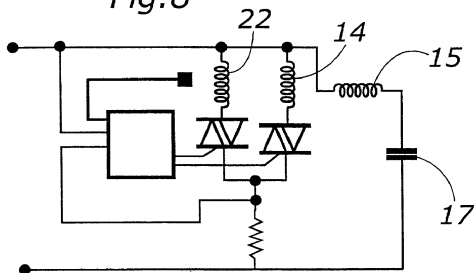


Fig. 9

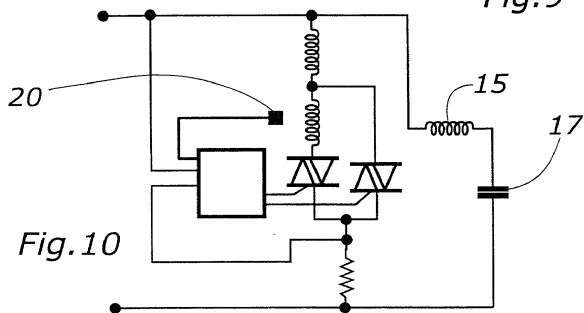


Fig. 10

Declaration and Power of Attorney for patent Application

Dichiarazione e procura ai fini della domanda di brevetto

Italian Language Declaration

Docket No.: 33848/GM/vp

Il sottoscritto inventore dichiara che:

La propria residenza, recapito postale e cittadinanza corrispondono a quanto indicato in calce, sotto la propria firma.

Ritiene di essere il primo ed unico inventore originale (se viene elencato in calce un solo nominativo) o il coinventore primo ed originale (se è elencato più di un nominativo) del oggetto rivendicato e per il quale il sottoscritto presenta domanda di brevetto. La invenzione in questione è chiamata

"DISPOSITIVO ELETTRONICO DI ALIMENTA-

ZIONE DI UN MOTORE SINCRONO CON ROTORE

A MAGNETI PERMANENTI A DUE COPPIE DI POLI"

e la sua descrizione è allegata alla presente Dichiarazione a meno che non sia spuntata la seguente casella:

- ☐ Il _____
è stata depositata una domanda di brevetto
statunitense numero o una domanda di brevetto
internazionale PCT numero _____
che è stata modificata il _____
(se applicabile).

Il sottoscritto dichiara in oltre di aver letto e compreso il contenuto della descrizione identificata in precedenza, rivendicazioni comprese, come modificati dall'eventuale modifica summenzionata.

Il sottoscritto riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codice dei Regolamenti Federali, §1.56.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

"ELECTRONIC POWER SUPPLY FOR A

SYNCHRONOUS MOTOR WITH PERMANENT-

MAGNET ROTOR HAVING TWO PAIRS OF POLES"

the specification of which is attached hereto unless the following box is checked:

- ☐ was filed on _____
as United States Application Number or PCT
International Application Number _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

Italian Language Declaration

Il sottoscritto rivendico con la presente la priorità prevista dal Titolo 35, Codice degli Stati Uniti, § 119(e)-(d) o § 365(a) in relazione a qualsiasi domanda o domande estere di brevetto o certificato di inventore, o dal Titolo 35, § 365(a) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale è designato almeno un paese diverso dagli Stati Uniti, i suddetti domande e certificati essendo elencati sotto, e, spuntando le seguenti caselle, ha anche identificato sotto qualsiasi domanda estera di brevetto o certificato di inventore, o domanda internazionale PCT, la cui data di deposito preceda quella della domanda per la quale è rivendicata la priorità.

Prior foreign application(s)

Domande Estere Anteriori

PD99A000190

(Number)
(Numero)

ITALY (ITALIA)

(Country)
(Nazione)

(Number)
(Numero)

(Country)
(Nazione)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codici degli Stati Uniti, § 119(e), in relazione a qualsiasi domanda o domande provvisorie degli Stati Uniti elencate sotto.

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codice degli Stati Uniti, § 120, in relazione a qualsiasi domanda o domande statunitensi, o dal Titolo 35, § 365(c) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale sono designati gli Stati Uniti, i suddette domande essendo elencate sotto e, nella misura in cui l'oggetto di ciascuna rivendicazione di questa domanda non sia stato esposto nella domanda statunitense o internazionale PCT anteriore nel modo previsto dal primo paragrafo del Titolo 35, Codice degli Stati Uniti, § 112, riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codici dei Regolamenti Federali, § 156, le quali diventino disponibili durante il periodo compreso tra la data di deposito della domanda anteriore e la data di deposito nazionale o internazionale PCT della presente domanda.

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

Con la presente, il sottoscritto dichiara veritiera tutte le affermazioni contenute in questa domanda in relazione alle proprie conoscenze e di ritenere vere tutte le affermazioni o informazioni presentate. Dichiaro inoltre che tali affermazioni sono state espresse nella piena consapevolezza che le dichiarazioni intenzionalmente false sono punibili con una multa, l'incarcerazione o entrambe, ai sensi della Sezione 1001 del Titolo 18 del Codice degli Stati Uniti e che tali dichiarazioni intenzionalmente false possono mettere a repentaglio la validità della domanda o di qualsiasi brevetto rilasciato in merito.

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed:

Priority not claimed

Diritto di priorità non rivendicato

6 AUGUST 1999 (6.8.1999)

(Day/Month/Year Filed)

(Giorno, Mese/Anno di deposito)

(Day/Month/Year Filed)

(Giorno, Mese/Anno di deposito)

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Status) (patented, pending, abandoned)

(Stato) (concessione di brevetto, in corso di esame, abbandono)

(Status) (patented, pending, abandoned)

(Stato) (concessione di brevetto, in corso di esame, abbandono)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Italian Language Declaration

PROCURA: Io, sottoscritto inventore, nomino con la presente il seguente avvocato o avvocati e/o agente o agenti al fine di istruire questa pratica e di condurre tutte le operazioni ad essa pertinenti presso l'Ufficio dei Brevetti e Marchi di Fabbrica. (Elencare il nome ed il numero di matricola)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (List name and registration number)

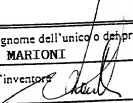
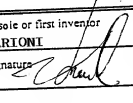
Guido MODIANO (Reg. No. 19,928)
Albert JOSIF (Reg. No. 22,917)
Daniel J. O'BYRNE (Reg. No. 36,625)

Inviare le corrispondenza a:

MODIANO & ASSOCIATI
Via Meravigli, 16
20123 MILANO - ITALY - EUROPE

Telefonare a:

(02) 86.92.442

Nome e cognome dell'unico o del primo inventore Elio MARIONI		Full name of sole or first inventor Elio MARIONI	
Firma dell'inventore 	Data 27 Luglio 2000	Inventor's signature 	Date July 27, 2000
Residenza 36031 DUEVILLE - ITALIA		Residence 36031 DUEVILLE - ITALY	
Via Molino 6		Via Molino 6	
Cittadinanza Italiana		Citizenship Italian	
Recapito o Casella Postale come Residenza		Post Office Address same as Residence	
Nome e completo dell'eventuale secondo coinventore		Full name of second or joint inventor	
Firma del secondo inventore	Data	Inventor's signature	Date
Residenza		Residence	
Cittadinanza		Citizenship	
Recapito o Casella Postale come Residenza		Post Office Address same as Residence	

(Fornire le stesse informazioni e le firme del terzo e degli ulteriori coinventori.)

(Supply similar information and signature for third and sub-sequent joint inventors.)